

Appl. No. 10/523,826
In re ARHAB et al.
Reply to Office Action of Aug. 21, 2009

Amendments to the Specification:

Please replace the Abstract with the following rewritten Abstract:

A hydrokinetic coupling device (10) which is intended, in particular, for a motor vehicle. The inventive hydrokinetic coupling device comprises is characterized in that it consists of a casing rotationally connecting a driving shaft and an impeller wheel, a turbine wheel fixed to a turbine hub rotationally connected to a driven shaft, a clutch locking the coupling of the driving and driven shafts, and a damping element [(20)] comprising elastic washers elements (100,110) for restricting the essentially-radial circulation of the fluid at least inside the a front axial space [(E1)] which is located between a front guide washer [(28)] and a web [(29)], such that the fluid circulates through the lockup clutch [(16)] of the device [(10)].

Please replace the paragraph beginning at page 1, line 4, with the following rewritten paragraph:

The present invention concerns a hydrokinetic coupling device (or hydrokinetic coupling appliance), in particular for a motor vehicle.

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Please replace the paragraph beginning at page 1, line 7, with the following rewritten paragraph:

There is already known in the prior art, for example from the documents FR-A-2.765.939 and US-A-5.975.561, a hydrokinetic coupling device ~~appliance~~, in particular for a motor vehicle, of the type comprising:

Please replace the paragraph beginning at page 3, line 18, with the following rewritten paragraph:

For this purpose, the invention proposes a hydrokinetic coupling device (hydrokinetic coupling appliance), in particular for a motor vehicle, of the type comprising:

Please replace the paragraph beginning at page 9, line 1, with the following rewritten paragraph:

As is known from the state of the art, a hydrokinetic coupling device (or hydrokinetic coupling appliance) 10_I [[10]] according to a first embodiment of the invention as illustrated in Figure 1 comprises, arranged in the same sealed casing, in two parts in the form of respectively front 2 and rear 1 shells, filled with a fluid such as oil, a torque converter 14 [[1]] and a lock-up clutch 16.

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Please replace the paragraph beginning at page 9, line 17, with the following rewritten paragraph:

The turbine wheel 12 also comprises blades 12a which face the blades 11a of the impeller wheel 11, and the turbine wheel is rotationally connected to a turbine hub 18 which is able to be rotationally connected to a driven shaft A2, coaxial with the axis X-X of the hydrokinetic coupling device 10₁ ~~appliance 10~~, by means here of a damping device 20.

Please replace the paragraph beginning at page 11, line 5, with the following rewritten paragraph:

The pressed-together angular sectors 38 define stop members provided to delimit circumferentially between them guidance and stop notches 42, which are each designed to allow the angular movement of an associated radial lug 44, formed radially in line with ~~[[the]]~~ an external peripheral edge 46 ~~[[48]]~~ of a damper plate 29 forming the output element of the damper 20.

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Please replace the paragraph beginning at page 11, line 11, with the following rewritten paragraph:

Each notch 42 comprises two circumferentially opposed radial edges 48, 49 ~~[[50]]~~, which form stop surfaces for the associated radial lug 44.

Please replace the paragraph beginning at page 11, line 14, with the following rewritten paragraph:

The coming into abutment of the radial lugs 44 against the stop surfaces 48, 49 ~~[[50]]~~ therefore determines a relative angular stop position between the guide washers 26, 28 and the damper plate 29.

Please replace the paragraph beginning at page 12, line 29, with the following rewritten paragraph:

The hydrokinetic coupling device 10₁ ~~appliance 10~~ comprises, at the front, a sealed chamber 74 which is delimited axially by the front shell 2 of the casing and by a piston 76. The piston 76 is able to move axially so as to be able to come to axially clamp, under the action of the pressure of the oil in the chamber 74, the clutch 16, here of the multi-disc type.

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Please replace the paragraph beginning at page 13, line 22, with the following rewritten paragraph:

The piston 76 comprises, at its external radial periphery, an annular ~~annual~~ groove in which first dynamic sealing means are mounted, such as a segment 90, which cooperates with a facing axial surface of the first connecting piece 82 and, at its internal radial periphery, a surface able to cooperate with second dynamic sealing means, such as a segment 92, which is mounted in an annular groove in a hub, or ~~centring~~ centering device 94, which ~~surrounds~~ is surrounded by the piston 76, with which it is rotationally connected by meshing.

Please replace the paragraph beginning at page 14, line 4, with the following rewritten paragraph:

The dynamic sealing means 90, 92 thus delimit the chamber 74, which is supplied with oil by a hollow shaft, here the driven shaft A2 ~~[[82]]~~, with suitable radial passages 96 being provided in the ~~centring~~ centering device 94.

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Please replace the paragraph beginning at page 14, line 8, with the following rewritten paragraph:

It should be noted that the appliance here is of the “three-channel” type, that is to say comprises a first channel V1 supplying the hydraulic circuit of the converter 14 and a second outlet channel V2, and a third channel V3 supplying the chamber 74 in order to move the ~~pistons~~ piston 76 axially, this third channel V3 being independent of the first V1 and second V2 channels of the converter 14.

Please replace the paragraph beginning at page 14, line 18, with the following rewritten paragraph:

The conventional functioning of ~~[[such a]] the hydrokinetic coupling device 10₁ appliance 10~~ will now be explained.

Please replace the paragraph beginning at page 15, line 13, with the following rewritten paragraph:

In the engaged state, that is to say when the piston 76 clamps the friction discs 80 by means of the multi-disc clutch 16, the torque of the driving shaft A1 ~~[[81]]~~ is transmitted first to the guide washers 26, 28, then to the damper plate 29, by means of the elastic members 50.

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Please replace the paragraph beginning at page 15, line 29, with the following rewritten paragraph:

For more details with regard to the implementation and functioning of ~~[[such a]]~~ the hydrokinetic coupling device 10₁ ~~appliance-10~~, reference can be made to one or other of the documents FR-A-2.765.939 and US-A-5.975.561.

Please replace the paragraph beginning at page 16, line 5, with the following rewritten paragraph:

In accordance with the teachings of the invention, the hydrokinetic coupling device 10₁ ~~appliance-10~~ comprises means for restricting the circulation of oil in a roughly radial direction, at least inside the front axial space E1, which is situated between the front guide washer 28 and the damper plate 29, so as to promote the circulation of oil, from the supply channel V1 to the discharge channel V2, through the lock-up clutch 16.

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Please replace the paragraph beginning at page 17, line 6, with the following rewritten paragraph:

This is because the flow of oil coming from the supply channel V1, which circulates between the front shell 2 and the damper 20, enters the front axial space E1 passing through the windows 60, or passing through the notches 42. This flow of oil is blocked by the front elastic washer 100, which prevents it from being directed to the discharge channel V2 ~~[[V1]]~~. Consequently the majority of the flow of oil will take an easier path, which passes through the clutch 16.

Please replace the paragraph beginning at page 19, line 21, with the following rewritten paragraph:

The circulation of oil in the hydrokinetic coupling device 10₁ ~~appliance 10~~ is illustrated, in Figure 1, by arrows.

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Please replace the paragraph beginning at page 19, line 24, with the following rewritten paragraph:

It will be noted that the invention also applies to ~~[[an]]~~ a hydrokinetic coupling device
~~appliance 10~~ in which the direction of circulation of the oil is reversed compared with that
depicted here.

Please replace the paragraph beginning at page 19, line 28, with the following rewritten paragraph:

It should be noted that the elastic washers 100, 110 contribute to the damping of the torsion
oscillations in the hydrokinetic coupling device 10~~1 appliance 10~~, since they form friction
elements between the guide washers 26, 28 and the damper plate 29.

Please replace the paragraph beginning at page 20, line 1, with the following rewritten paragraph:

In addition, the elastic washers 100, 110 participate in the axial positioning of the elements of
the damper 20 in the appliance 10, compensating for the axial play.

Please replace the paragraph beginning at page 20, line 17, with the following rewritten paragraph:

It should be noted that, in the first embodiment, a flow of oil can circulate in the rear axial space E2, passing between the teeth 30 on the turbine hub 18 and the teeth 32 on the rear guide washer 26. This flow of oil is slight, since the rear guide washer 26 meshes without play on the turbine hub 18 and because the flow of oil depends solely on the radial play between the teeth 30, 32. This is because the axial movement of the rear guide washer 26 with respect to the turbine hub 18 does not modify the cross-section of flow of the oil between the two elements 18, 26, unlike a hydrokinetic coupling device an appliance 10 in which the teeth on the turbine hub 18 form blocks which extend axially forwards from the front radial surface of the turbine hub 18, such as the appliances depicted in the documents FR-A-2.765.939 and US-A-5.975.561.

Please replace the paragraph beginning at page 21, line 18, with the following rewritten paragraph:

The advantageous embodiment of the meshing of the rear guide washer 26 on the turbine hub 18, which has just been described, can be used in other configurations of hydrokinetic coupling devices appliances10, in particular in a hydrokinetic coupling device an appliance 10 which does not have any means for restricting the flow of oil in the damper 20.

Please replace the paragraph beginning at page 21, line 25, with the following rewritten paragraph:

With a view to improving the “seal” on the damper 20, in the rear axial space E2, a hydrokinetic coupling device 10₂ according to a second embodiment, depicted in Figure 3, makes provision for axially interposing the rear elastic washer 110 between the damper plate 29 and a front radial surface 114 of the turbine hub 18.

Please replace the paragraph beginning at page 22, line 7, with the following rewritten paragraph:

Figure 4 depicts a hydrokinetic coupling device 10₃ according to a third embodiment in which the damper 20 comprises single elastic washer 100, in the front axial space E1, and in which the turbine hub 18 comprises a continuous annular radial surface 116, which is designed to be in axial abutment towards the front against the rear face of the damper plate 29.

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Please replace the paragraph beginning at page 22, line 32, with the following rewritten paragraph:

In Figures 5 to 7, a fourth embodiment of the invention has been depicted in which [[the]] a hydrokinetic coupling device 10₄ comprises a damper 20' [[20]] that is entirely “closed” and has no elastic washer 100, 110.

Please replace the paragraph beginning at page 23, line 4, with the following rewritten paragraph:

According to this embodiment, the damper 20' includes rear and front guide washers 26' and 28', respectively, such that the central guide part 54, 56 of each guide washer 26' [[26]], 28' [[28]] is solid, that is to say it has no window 58, 60.

Please replace the paragraph beginning at page 23, line 8, with the following rewritten paragraph:

The central guide part 54, 56 of each guide washer 26' [[26]], 28' [[28]] therefore forms, in line with the elastic members 50, complementary protrusions 120, in place of the windows 58, 60.

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Please replace the paragraph beginning at page 23, line 21, with the following rewritten paragraph:

The guide washers 26' [[26]], 28' [[28]] must therefore comprise, for each pair of springs 126, 128, two circumferentially opposed support surfaces on which the two springs 126, 128 can bear.

Please replace the paragraph beginning at page 23, line 25, with the following rewritten paragraph:

For reasons of cost and simplicity of manufacture, it is wished to be able to conform the guide washers 26' [[26]], 28' [[28]] by pressing. This production method does not make it possible to sufficiently deform the sheet metal constituting the guide washers 26' [[26]], 28' [[28]], towards the damper plate 29, to enable the small-diameter springs 126, or internal springs, arranged coaxially in the large-diameter springs 128, or external springs, to come into abutment circumferentially against the support surfaces 122, 124.

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Please replace the paragraph beginning at page 24, line 14, with the following rewritten paragraph:

Advantageously, according to the fourth embodiment, the external peripheral edge 34, 36 of each guide washer 26' [[26]], 28' [[28]] is continuous and adjacent to the facing external peripheral edge 34, 36, so as to "close" the damper 20' [[20]] at its external periphery.

Please replace the paragraph beginning at page 24, line 20, with the following rewritten paragraph:

Comparing the view in Figure 6 and the view in Figure 2, it can therefore be seen that the guide washers 26' [[26]], 28' [[28]] no longer have any cut-outs forming circumferential notches 42.

Please replace the paragraph beginning at page 24, line 24, with the following rewritten paragraph:

The external peripheral edge 34, 36 of each guide washer 26' [[26]], 28' [[28]] has angular sectors 38 which are riveted to the facing angular sectors 38.

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Please replace the paragraph beginning at page 24, line 28, with the following rewritten paragraph:

According to the embodiment depicted here, the front guide washer 28 comprises angular sectors 134 which are interposed between two riveted angular sectors 38 and which each form a protrusion 136, convex towards the front, delimiting an axial space between the two guide washers 26' [[26]], 28' [[28]] to allow the angular movement of the associated radial lug 44 of the damper plate 29. The protrusions 136 replace the circumferential notches 42.

Please replace the paragraph beginning at page 26, line 17, with the following rewritten paragraph:

Figure 8 depicts a hydrokinetic coupling device 10, according to a fifth embodiment of the invention, comprising a damper 20", which is similar to the previous one, but in which the rear guide washer 26" [[26]] is similar to the rear guide washer 26 [[that]] of the third embodiment, which is depicted in Figure 4. The rear guide washer 26" [[26]] is therefore not solid but comprises windows 58 in line with the elastic members 50.

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Please replace the paragraph beginning at page 26, line 23, with the following rewritten paragraph:

Advantageously, an ~~the~~ external peripheral edge 34 ~~34~~ of the rear guide washer 26 ~~26~~ is extended axially towards the rear by a deflector 140 in the form of an axial skirt.

Please replace the paragraph beginning at page 27, line 1, with the following rewritten paragraph:

The deflector 140 is preferably arranged so as to minimize ~~minimise~~ the axial space between the external periphery of the damper 20 ~~20~~ and the turbine wheel 12 so that the majority of the flow of oil flows towards the axial space between the front shell 2 and the external periphery of the damper 20 ~~20~~ in order to pass through the clutch 16.

Please replace the paragraph beginning at page 27, line 7, with the following rewritten paragraph:

Naturally the deflector 140 can also equip ~~and appliance 10~~ a hydrokinetic coupling device of the present invention in which the two guide washers 26, 28 are solid, like the one which is depicted in Figures 5 to 7.

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Please replace the paragraph beginning at page 27, line 10, with the following rewritten paragraph:

In the variant embodiment of the hydrokinetic coupling ~~appliance-10~~ device of the present invention which is depicted in the figures 1, 3-5 and 8-11, the output hub 70 comprises, at the front, axial stop means cooperating with a portion of the front face of the damper 29 and with a portion of the rear face of the front guide washer 28 (or 28'), so as to hold the damping device ~~[[20]]~~ of the present invention axially on the output hub 70.

Please replace the paragraph beginning at page 27, line 16, with the following rewritten paragraph:

These axial stop means, during the functioning of the hydrokinetic coupling device of the present invention ~~appliance-10~~, limit the axial movement of the damper plate 29 with respect to the output hub 70, towards the front.

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Please replace the paragraph beginning at page 27, line 19, with the following rewritten paragraph:

These axial stop means also make it possible to assemble the ~~damping device~~²⁰ damper on the output hub 70, before they are mounted in the hydrokinetic coupling ~~device~~ appliance¹⁰, so as to produce a subassembly which facilitates the transport of ~~these elements~~²⁰; the damper and the output hub 70 as far as the place of their mounting in the hydrokinetic coupling device of the present invention ~~appliance~~¹⁰.

Please replace the paragraph beginning at page 27, line 25, with the following rewritten paragraph:

In addition, the formation of such a subassembly facilitates the mounting of the output hub 70 and ~~damping device~~²⁰ damper in the hydrokinetic coupling device of the present invention ~~appliance~~¹⁰.

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Please replace the paragraph beginning at page 29, line 8, with the following rewritten paragraph:

During the functioning of the hydrokinetic coupling device of the present invention ~~appliance~~ 10, it is found that, towards the rear, the damper plate 29 is held axially by the turbine hub 18, against which it comes into axial abutment before the front guide washer 28 comes into axial abutment against the front radial surface 158 of the output hub 70.

Please replace the paragraph beginning at page 30, line 7, with the following rewritten paragraph:

Conventionally, the hydrokinetic coupling device of the present invention ~~appliance~~ 10 generally comprises bearing means 162 which are interposed axially between the ~~centring~~ centering device 94 and the front radial surface 158 of the main section 146. These bearing means 162 consist here of a needle thrust bearing comprising rolling elements mounted between two front 164 and rear 166 radial plates.